

N-Channel 60 V (D-S) Super Junction Power MOSFET

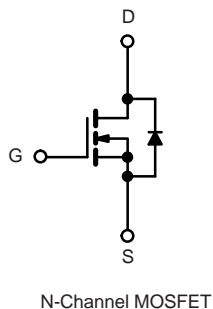
PRODUCT SUMMARY		
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^a
60	0.0035 at V _{GS} = 10 V	130
	0.0042 at V _{GS} = 4.5 V	110

FEATURES

- 175 °C Junction Temperature
- TrenchFET II Power MOSFET
- Material categorization:



RoHS
COMPLIANT



ABSOLUTE MAXIMUM RATINGS (T _C = 25 °C, unless otherwise noted)				
Parameter		Symbol	Limit	Unit
Gate-Source Voltage		V _{GS}	± 20	V
Continuous Drain Current (T _J = 175 °C) ^b	T _C = 25 °C	I _D	130	A
	T _C = 100 °C		110 ^a	
Pulsed Drain Current		I _{DM}	480	
Continuous Source Current (Diode Conduction)		I _S	110 ^a	
Avalanche Current		I _{AS}	110	
Single Avalanche Energy (Duty Cycle ≤ 1 %)	L = 0.1 mH	E _{AS}	500	mJ
Maximum Power Dissipation	T _C = 25 °C	P _D	180	W
	T _A = 25 °C		3 ^b , 8.5 ^{b, c}	
Operating Junction and Storage Temperature Range		T _J , T _{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^a	t ≤ 10 sec	R _{thJA}	15	18	°C/W
	Steady State		40	50	
Maximum Junction-to-Case		R _{thJC}	0.85	1.1	

Notes:

a. Package limited.

b. Surface mounted on 1" x 1" FR4 board.

c. t ≤ 10 s.

SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)

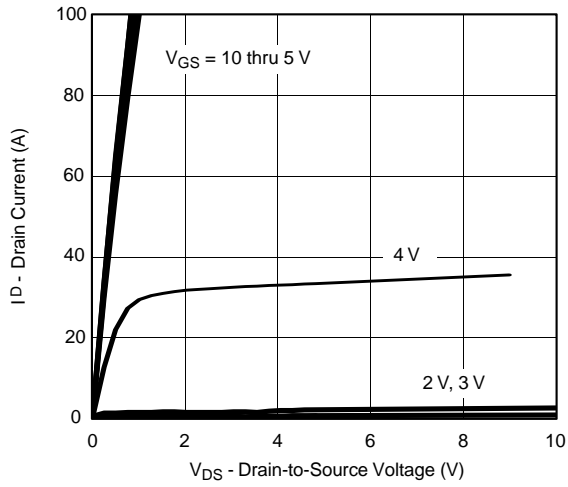
Parameter	Symbol	Test Conditions	Min.	Typ. ^a	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	60			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1		2.5	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 48\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 48\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$			50	
		$V_{DS} = 48\text{ V}, V_{GS} = 0\text{ V}, T_J = 175\text{ }^\circ\text{C}$			250	
On-State Drain Current ^b	$I_{D(on)}$	$V_{DS} = 5\text{ V}, V_{GS} = 10\text{ V}$	130			A
Drain-Source On-State Resistance ^b	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 20\text{ A}$		0.0035	0.0040	Ω
		$V_{GS} = 10\text{ V}, I_D = 20\text{ A}, T_J = 125\text{ }^\circ\text{C}$		0.0040	0.0050	
		$V_{GS} = 10\text{ V}, I_D = 10\text{ A}, T_J = 175\text{ }^\circ\text{C}$		0.0045	0.0055	
		$V_{GS} = 4.5\text{ V}, I_D = 15\text{ A}$		0.0042	0.0050	
Forward Transconductance ^b	g_{fs}	$V_{DS} = 48\text{ V}, I_D = 20\text{ A}$		50		S
Dynamic						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 48\text{ V}, f = 1\text{ MHz}$		3950		μF
Output Capacitance	C_{oss}			670		
Reverse Transfer Capacitance	C_{rss}			23		
Total Gate Charge ^c	Q_g	$V_{DS} = 48\text{ V}, V_{GS} = 10\text{ V}, I_D = 20\text{ A}$		67	78	nC
Gate-Source Charge ^c	Q_{gs}			12		
Gate-Drain Charge ^c	Q_{gd}			8.5		
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = 48\text{ V}, R_L = 0.6\text{ }\Omega$ $I_D \cong 20\text{ A}, V_{GEN} = 10\text{ V}, R_g = 2.5\text{ }\Omega$		10	20	ns
Rise Time ^c	t_r			5	15	
Turn-Off Delay Time ^c	$t_{d(off)}$			55	70	
Fall Time ^c	t_f			12	20	
Source-Drain Diode Ratings and Characteristics ($T_C = 25\text{ }^\circ\text{C}$)						
Pulsed Current	I_{SM}				130	A
Diode Forward Voltage	V_{SD}	$I_F = 20\text{ A}, V_{GS} = 0\text{ V}$		1	1.2	V
Reverse Recovery Time	t_{rr}	$I_F = 20\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		45	100	ns

Notes:

- For design aid only; not subject to production testing.
- Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- Independent of operating temperature.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

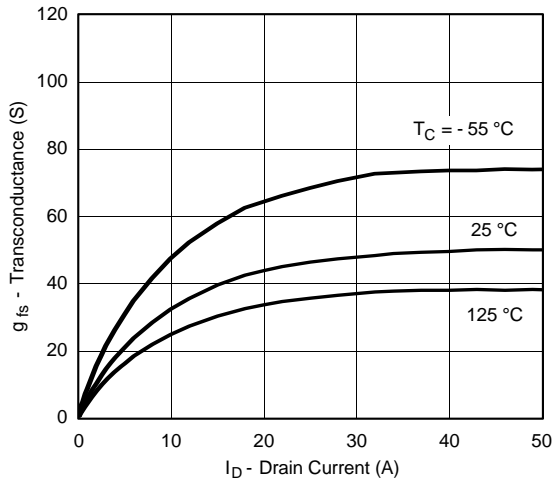
TYPICAL CHARACTERISTICS (25 °C unless noted)



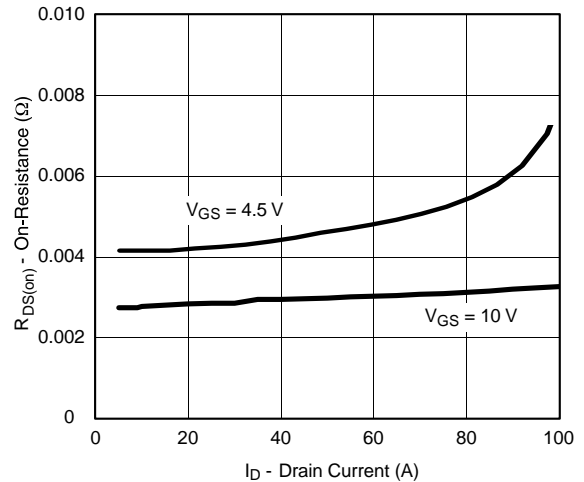
Output Characteristics



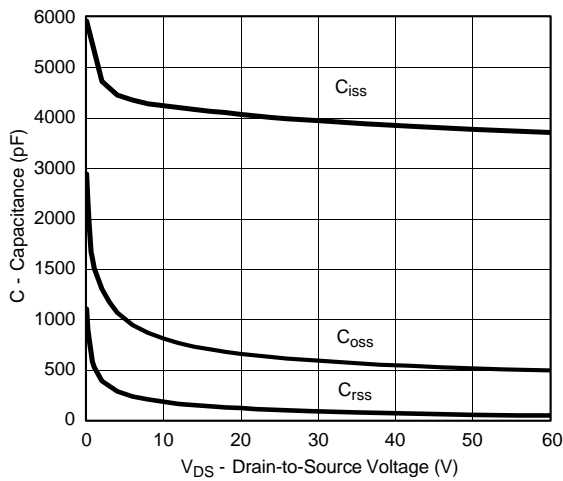
Transfer Characteristics



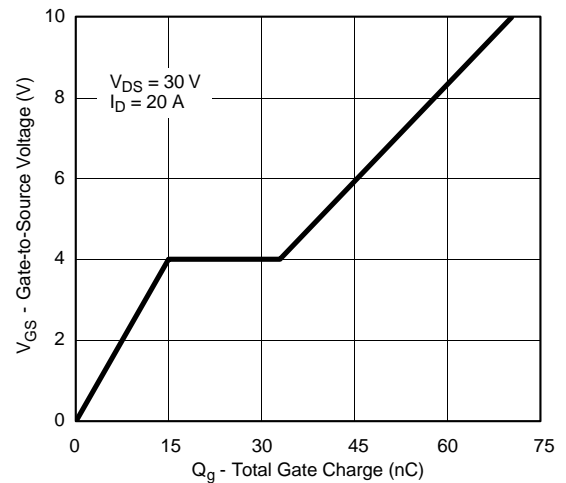
Transconductance



On-Resistance vs. Drain Current

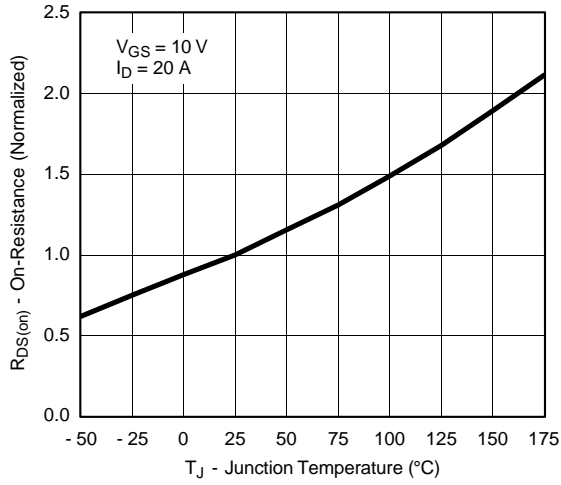


Capacitance

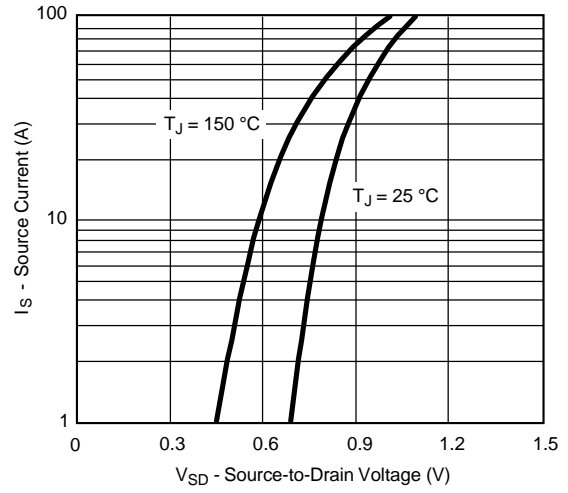


Gate Charge

TYPICAL CHARACTERISTICS (25 °C unless noted)

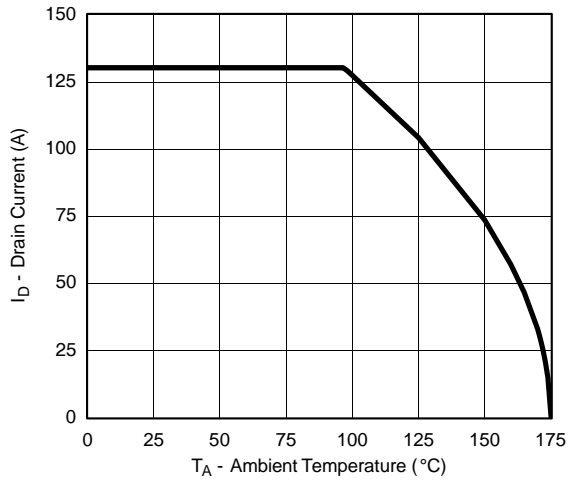


On-Resistance vs. Junction Temperature

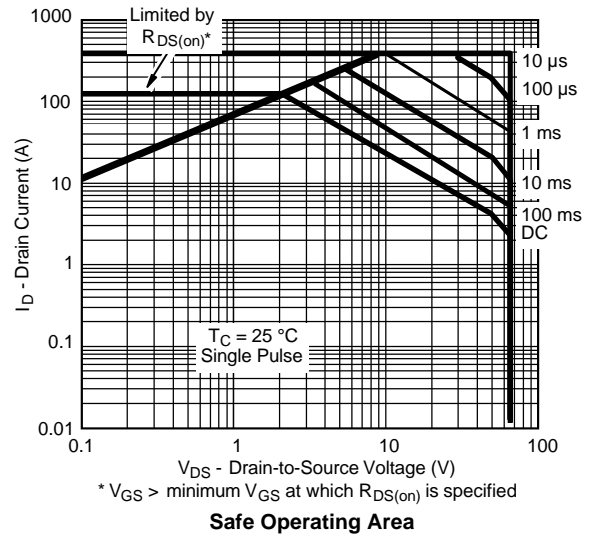


Source-Drain Diode Forward Voltage

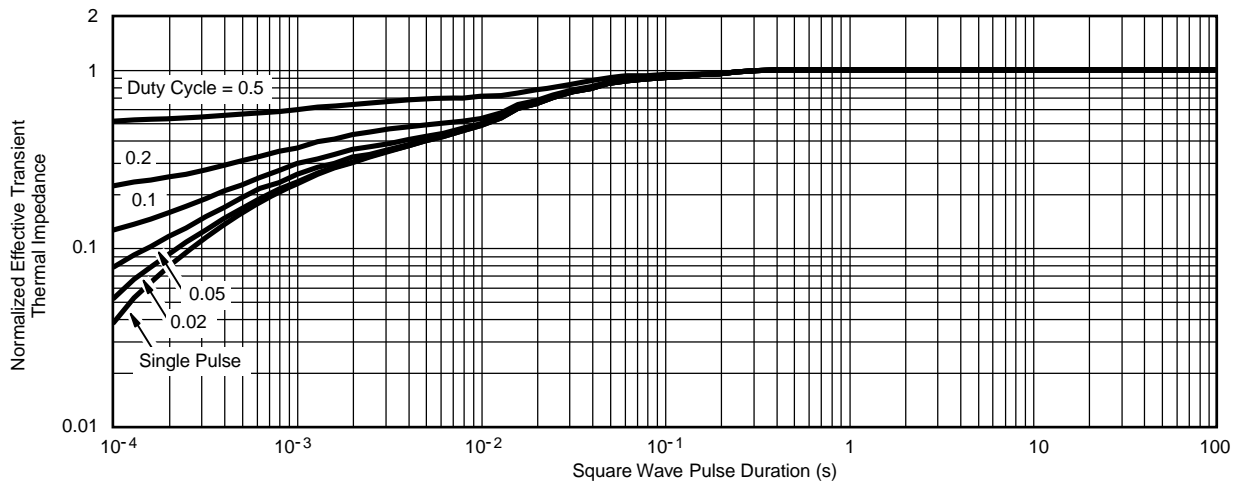
THERMAL RATINGS



Maximum Drain Current vs. Ambient Temperature

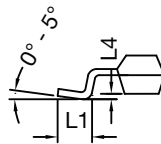
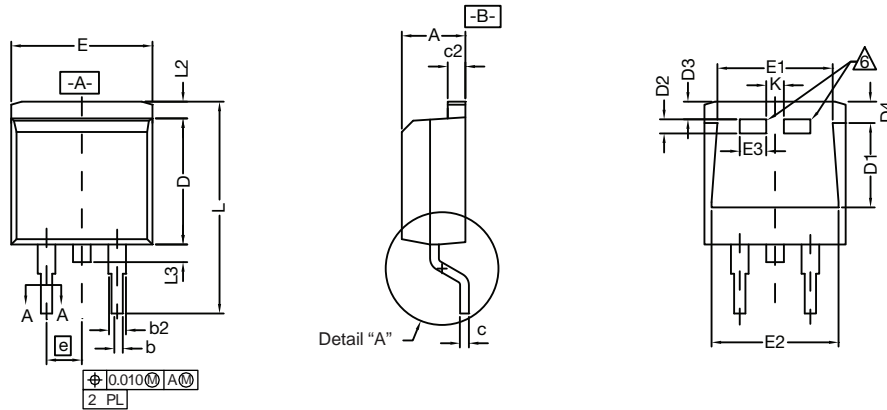


Safe Operating Area

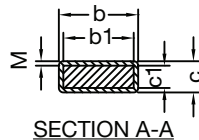


Normalized Thermal Transient Impedance, Junction-to-Case

TO-263 (D²PAK): 3-LEAD



DETAIL A (ROTATED 90°)



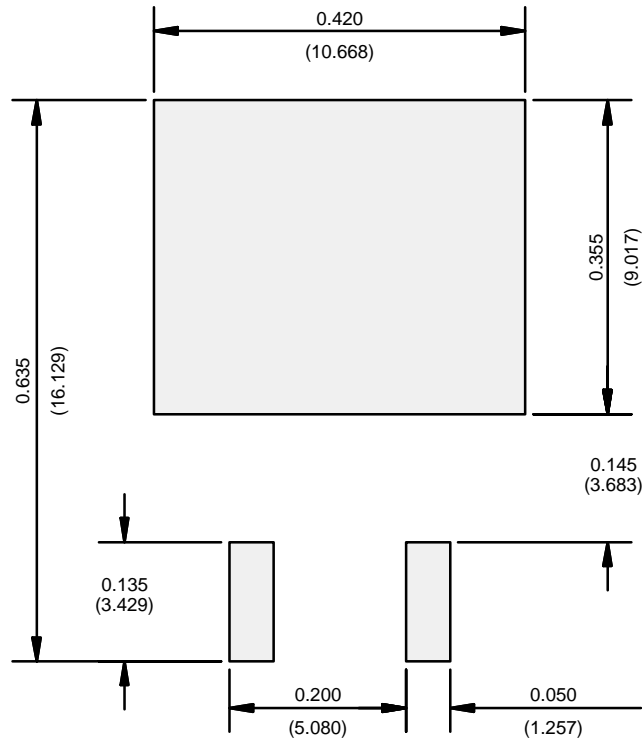
SECTION A-A

DIM.	INCHES		MILLIMETERS		
	MIN.	MAX.	MIN.	MAX.	
A	0.160	0.190	4.064	4.826	
b	0.020	0.039	0.508	0.990	
b1	0.020	0.035	0.508	0.889	
b2	0.045	0.055	1.143	1.397	
c*	Thin lead	0.013	0.018	0.330	0.457
	Thick lead	0.023	0.028	0.584	0.711
c1	Thin lead	0.013	0.017	0.330	0.431
	Thick lead	0.023	0.027	0.584	0.685
c2	0.045	0.055	1.143	1.397	
D	0.340	0.380	8.636	9.652	
D1	0.220	0.240	5.588	6.096	
D2	0.038	0.042	0.965	1.067	
D3	0.045	0.055	1.143	1.397	
D4	0.044	0.052	1.118	1.321	
E	0.380	0.410	9.652	10.414	
E1	0.245	-	6.223	-	
E2	0.355	0.375	9.017	9.525	
E3	0.072	0.078	1.829	1.981	
e	0.100 BSC		2.54 BSC		
K	0.045	0.055	1.143	1.397	
L	0.575	0.625	14.605	15.875	
L1	0.090	0.110	2.286	2.794	
L2	0.040	0.055	1.016	1.397	
L3	0.050	0.070	1.270	1.778	
L4	0.010 BSC		0.254 BSC		
M	-	0.002	-	0.050	
ECN: T13-0707-Rev. K, 30-Sep-13					
DWG: 5843					

Notes

1. Plane B includes maximum features of heat sink tab and plastic.
2. No more than 25 % of L1 can fall above seating plane by max. 8 mils.
3. Pin-to-pin coplanarity max. 4 mils.
4. *: Thin lead is for SUB, SYB.
Thick lead is for SUM, SYM, SQM.
5. Use inches as the primary measurement.
6. This feature is for thick lead.

RECOMMENDED MINIMUM PADS FOR D²PAK: 3-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

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